

February 20, 2003

Mr. John L. Skolds, President  
Exelon Nuclear  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2 - ISSUANCE OF AMENDMENTS  
(TAC NOS. MB4851 AND MB4852)

Dear Mr. Skolds:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 126 to Facility Operating License No. NPF-72 and Amendment No. 126 to Facility Operating License No. NPF-77 for the Braidwood Station, Unit Nos. 1 and 2, respectively. The amendments are in response to your application dated April 19, 2002, supplemented by your letters dated September 9, 2002, and January 3, 2003.

The amendments revise Technical Specifications (TS) 3.6.6, "Containment Spray and Cooling Systems," to change the frequency of Surveillance Requirement (SR) 3.6.6.8 from "10 years" to "Following maintenance that could result in nozzle blockage OR Following fluid flow through nozzles." The proposed frequency of "Following maintenance that could result in nozzle blockage" is consistent with similar changes previously approved by the NRC on other dockets.

This safety evaluation addresses Braidwood Station Units 1 and 2 only. The NRC staff's evaluation of the Byron Units 1 and 2 will be addressed separately.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,  
/RA/

Mahesh Chawla, Project Manager, Section 2  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-456 and STN 50-457

Enclosures: 1. Amendment No. 126 to NPF-72  
2. Amendment No. 126 to NPF-77  
3. Safety Evaluation

cc w/encls: See next page

Braidwood Station Units 1 and 2

cc:

Regional Administrator, Region III  
U.S. Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, IL 60532-4351

Illinois Department of Nuclear Safety  
Office of Nuclear Facility Safety  
1035 Outer Park Drive  
Springfield, IL 62704

Document Control Desk-Licensing  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

Ms. C. Sue Hauser, Project Manager  
Westinghouse Electric Corporation  
Energy Systems Business Unit  
Post Office Box 355  
Pittsburgh, PA 15230

Joseph Gallo  
Gallo & Ross  
1025 Connecticut Ave., NW, Suite 1014  
Washington, DC 20036

Ms. Bridget Little Rorem  
Appleseed Coordinator  
117 N. Linden Street  
Essex, IL 60935

Howard A. Learner  
Environmental Law and Policy  
Center of the Midwest  
35 East Wacker Dr., Suite 1300  
Chicago, IL 60601-2110

U.S. Nuclear Regulatory Commission  
Braidwood Resident Inspectors Office  
35100 S. Rt. 53, Suite 79  
Braceville, IL 60407

Ms. Lorraine Creek  
RR 1, Box 182  
Manteno, IL 60950

Illinois Emergency Management  
Agency  
Division of Disaster Assistance &  
Preparedness  
110 East Adams Street  
Springfield, IL 62701-1109

Chairman  
Will County Board of Supervisors  
Will County Board Courthouse  
Joliet, IL 60434

Attorney General  
500 S. Second Street  
Springfield, IL 62701

George L. Edgar  
Morgan, Lewis and Bockius  
1800 M Street, NW  
Washington, DC 20036-5869

Braidwood Station Manager  
Exelon Generation Company, LLC  
35100 S. Rt. 53, Suite 84  
Braceville, IL 60407-9619

Site Vice President - Braidwood  
Exelon Generation Company, LLC  
35100 S. Rt. 53, Suite 84  
Braceville, IL 60407-9619

Senior Vice President, Nuclear Services  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

Vice President  
Mid-West Operations Support  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

Chairman, Ogle County Board  
Post Office Box 357  
Oregon, IL 61061

Exelon Generation Company, LLC  
Regulatory Assurance Manager - Braidwood  
35100 S. Rt. 53, Suite 84  
Braceville, IL 60407-9619

Mr. John L. Skolds, President  
Exelon Nuclear  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

Senior Vice President  
Mid-West Regional Operating Group  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

Director Licensing  
Mid-West Regional Operating Group  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

Senior Counsel, Nuclear  
Mid-West Regional Operating Group  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

Vice President - Licensing and Regulatory Affairs  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

Manager Licensing  
Braidwood and Byron  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

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The amendments revise Technical Specifications (TS) 3.6.6, "Containment Spray and Cooling Systems," to change the frequency of Surveillance Requirement (SR) 3.6.6.8 from "10 years" to "Following maintenance that could result in nozzle blockage OR Following fluid flow through nozzles." The proposed frequency of "Following maintenance that could result in nozzle blockage" is consistent with similar changes previously approved by the NRC on other dockets.

This safety evaluation addresses Braidwood Station Units 1 and 2 only. The NRC staff's evaluation of the Byron Units 1 and 2 will be addressed separately.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

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Mahesh Chawla, Project Manager, Section 2  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-456 and STN 50-457

Enclosures: 1. Amendment No. 126 to NPF-72  
2. Amendment No. 126 to NPF-77  
3. Safety Evaluation

cc w/encls: See next page

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MChawla	OGC, O15B18	AMendiola	GHill (8), T5C3
			RLobel

**ADAMS Accession Number: ML022880596**

\*See previous concurrence

OFFICE	PM:LPD3-2	LA:LPD3-2	SC:SPLB	SC:RORP	OGC	SC:LPD3-2
NAME	MChawla	THarris	*SWeerakkody	*RDennig	*RHefling	LRaghavan for AMendiola
DATE	2/26/03	2/27/03	01/31/03	02/03/03	02/06/03	2/25/03

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EXELON GENERATION COMPANY, LLC

DOCKET NO. STN 50-456

BRAIDWOOD STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 126  
License No. NPF-72

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Exelon Generation Company, LLC (the licensee) dated April 19, 2002, as supplemented by letters dated September 9, 2002, and January 3, 2003, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-72 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 126 and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 30 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

***/RA by LRaghavan for/***

Anthony J. Mendiola, Chief, Section 2  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: February 20, 2003

EXELON GENERATION COMPANY, LLC

DOCKET NO. STN 50-457

BRAIDWOOD STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 126  
License No. NPF-77

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Exelon Generation Company, LLC (the licensee) dated April 19, 2002, as supplemented by letters dated September 9, 2002, and January 3, 2003, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-77 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 126 and the Environmental Protection Plan contained in Appendix B, both of which were attached to License No. NPF-72, dated July 2, 1987, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 30 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA by LRaghavan for/*

Anthony J. Mendiola, Chief, Section 2  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: February 20, 2003

ATTACHMENT TO LICENSE AMENDMENT NOS. 126 AND 126

FACILITY OPERATING LICENSE NOS. NPF-72 AND NPF-77

DOCKET NOS. STN 50-456 AND STN 50-457

Replace the following page of the Appendix "A" Technical Specifications with the attached page. The revised page is identified by amendment number and contains marginal lines indicating the area of change.

Remove Page

3.6.6-3

Insert Page

3.6.6-3

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 126 TO FACILITY OPERATING LICENSE NO. NPF-72,

AND AMENDMENT NO. 126 TO FACILITY OPERATING LICENSE NO. NPF-77

EXELON GENERATION COMPANY, LLC

BRAIDWOOD STATION, UNIT NOS. 1 AND 2

DOCKET NOS. STN 50-456 AND STN 50-457

1.0 INTRODUCTION

By application dated April 19, 2002, as supplemented by letters dated September 9, 2002, and January 3, 2003, Exelon Generation Company, LLC (the licensee) requested changes to the Technical Specifications (TSs) for the Braidwood Station, Units 1 and 2, and Byron Station Units 1 and 2. The supplementary letters dated September 9, 2002, and January 3, 2003, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on June 11, 2002 (67 FR 40023).

The proposed changes would revise Technical Specifications (TS) 3.6.6, "Containment Spray and Cooling Systems," to change the frequency of Surveillance Requirement (SR) 3.6.6.8 from "10 years" to "Following maintenance that could result in nozzle blockage OR Following fluid flow through nozzles." The proposed frequency of "Following maintenance that could result in nozzle blockage" is consistent with similar changes previously approved by the NRC on other dockets.

This safety evaluation addresses Braidwood Station Units 1 and 2 only. The NRC staff's evaluation of the Byron Units 1 and 2 will be addressed separately.

2.0 REGULATORY EVALUATION

10 CFR Part 50 Appendix A contains General Design Criteria (GDC) for nuclear power reactors. In particular, GDC 40 requires that the containment heat removal system be designed to permit periodic functional testing. The containment spray system is included in the containment heat removal system.

The Westinghouse Standard Technical Specifications, Volume 1, Revision 2, dated June 2001, NUREG-1431, SR 3.6.6.A.8 specifies a testing frequency of 10 years for the nozzle blockage test. While this is not a requirement, it has been the staff and industry's current judgment of an acceptable frequency for this test.

### 3.0 TECHNICAL EVALUATION

The containment heat removal systems for the Braidwood Station consist of the reactor containment fan cooler system and the containment spray system. The containment spray system actuates automatically (on a High-3 containment pressure signal) or remote-manually from the control room. The containment spray system has two safety functions. The containment spray system removes heat from the containment atmosphere following a design basis loss-of-coolant accident (LOCA) or main steam line break accident inside containment. This ensures that the containment pressure does not exceed the containment design pressure. The containment spray system also removes iodine and other radionuclides from the containment atmosphere following a LOCA.

The containment spray system is described in Section 6.5.2, "Containment Spray Systems," of the Braidwood Station Updated Final Safety Analysis Report (UFSAR). It consists of two independent 100 percent capacity trains with no common headers. The nozzles are made of corrosion resistant stainless steel and are of a swirl chamber design without any internal parts which could cause clogging. The system includes six spray headers, each with a different number of nozzles ranging from 39 nozzles in Ring Header 1 to 120 nozzles in Ring Header 5. The minimum area flow path in the containment spray system is the spray nozzle. The licensee states that the nozzle orifice will pass particles less than 0.375 inches in diameter.

Technical Specification Surveillance Requirement 3.6.6.8 currently requires a test every 10 years to ensure that the containment spray system nozzles are not obstructed. The test is currently done, according to the licensee's April 19, 2002, letter, with the spray inlet valves closed. Hot air is blown through test connections downstream of the spray inlet valves and thermographs confirm flow from each nozzle. The TS Bases accompanying the proposed change discuss the use of flowing low pressure air or smoke to detect blockage. Both hot air, low pressure air, or smoke are acceptable methods that are used by the industry.

One postulated mode of blockage of the spray headers and nozzles is solid boric acid accumulation in the spray lines or nozzles due to evaporated borated water. The spray headers are maintained dry and are isolated from the water in the containment spray system by normally closed, containment isolation valves (CS007A/B motor operated valves outside containment, and CS008A/B check valves inside containment). Since these valves are containment isolation valves they are subject to leakage rate testing in accordance with 10 CFR Part 50 Appendix J. In addition, the height of the water in the header upstream of the containment isolation valves corresponds to the water level in the refueling water storage tank (RWST) which is the initial borated water source for the containment spray system. Therefore, borated water cannot reach the spray nozzles without a containment spray system actuation.

Another possible blockage source is debris (foreign material) in the system. The licensee's September 9, 2002, letter states that routine maintenance and calibrations are routinely performed on the containment spray system. During this work the system may be open and the

licensee's foreign material exclusion (FME) program would then be in effect. This letter describes the licensee's FME program. Inventory of all material used and capture of all foreign material created (such as from grinding, welding, and machining) are important aspects of this program. The licensee also describes steps to be taken if control of foreign material is lost. In this case, a recovery plan would be developed and approved by the system engineer or a cognizant management individual before it is implemented. The staff requested more information from the licensee related to the effectiveness of the FME program at the Braidwood Station, both generally and specifically concerning the containment spray system. The licensee replied to this request in a letter dated January 3, 2003. Details of the surveillances requiring opening of the system are discussed as well as the FME procedures and the status of the FME program at Braidwood station. This is discussed further below.

#### Performance History at Braidwood

The licensee's September 9, 2002, letter describes the past testing done to ensure that there is no debris in the system. As part of pre-operational testing, the containment spray system was tested at full flow from the RWST to the reactor cavity with a blind flange installed downstream of a tee connection in the discharge line between the vertical riser and the nozzles. Subsequently, in 1991 both units were tested by blowing hot air through the risers. A thermograph of each nozzle confirmed that there was no blockage.

Therefore, it appears that the spray nozzles were unobstructed as of the last flow test.

The Licensee's January 3, 2003, letter states that all maintenance work packages that breached the containment spray system downstream of the containment isolation valves since the last containment spray surveillance test in 1991 were reviewed. Each package had a positive indication that the system was left clean and free of foreign material. Therefore, the staff has confidence that no foreign material entered the containment spray systems at each unit since the last flow test.

Past events in which there was a loss of foreign material control in other systems were discussed in the January 3, 2003, letter and the trend of the loss of foreign material control events was analyzed. The staff considers the licensee's response to each of these events to have been appropriate and that the current status of the foreign material efforts at Braidwood station are acceptable. This is based on the information in the licensee's January 3, 2003, letter and NRC inspection activity at the Braidwood station.

#### Industry Experience and Failure Mechanisms

Review of industry experience using the NRC's Sequence Coding and Search System for Licensee Event Reports indicates that spray systems of similar design are highly reliable (i.e., not susceptible to plugging). The staff reviewed industry experience and found that, with a few exceptions, once tested after construction, containment spray nozzles have not been subject to blockage. There have been several exceptions. In the case of one pressurized water reactor (PWR), a chemical added to the inner surface of a spray system pipe to eliminate corrosion detached and the loose material blocked some spray nozzles. Spray piping in PWRs is corrosion resistant, particularly at Braidwood; therefore, this failure mechanism is not applicable to Braidwood. The licensee for another PWR found debris, identified as construction debris, in

the spray nozzle headers. The fraction of blockage was not significant and the sprays remained functional. The debris was found by visual observation, not by an air flow test.

### Summary

As a result of reviewing the licensee's request to revise the testing frequency for the containment spray nozzles from "10 years" to "following maintenance which could result in nozzle blockage OR following fluid flow through the nozzles," and reviewing and assessing all the applicable information provided by the licensee, including information in the Braidwood UFSAR, the staff concludes that the design of the Braidwood containment spray systems, the past history of these spray systems, and the licensee's FME controls provide reasonable assurance that the potential for nozzle obstruction is acceptably low. The FME controls provide protection against the introduction of foreign materials into open piping during maintenance or testing and require post-maintenance verification of system cleanliness and freedom from foreign materials. In addition, our review of industry-wide experience has not demonstrated a problem with the licensee's proposed change. Therefore, the staff finds the amendment request acceptable.

A similar TS change for the Perry Nuclear Power Plant, Unit 1, was approved by Amendment 113 issued June 29, 2000, and for the Clinton Power Station, Unit 1, by Amendment 146 issued March 28, 2002. Since then, the NRC has approved similar requested changes to the containment spray system surveillance requirement for several other nuclear power plants.

## 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified of the proposed issuance of the amendment. The State official had no comments.

## 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (67 FR 40023). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

## 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Richard Lobel

Date: February 20, 2003